

Jan. 17, 1956

M. W. MAIER

2,731,011

STOVE CONSTRUCTION

Filed March 18, 1953

2 Sheets-Sheet 1

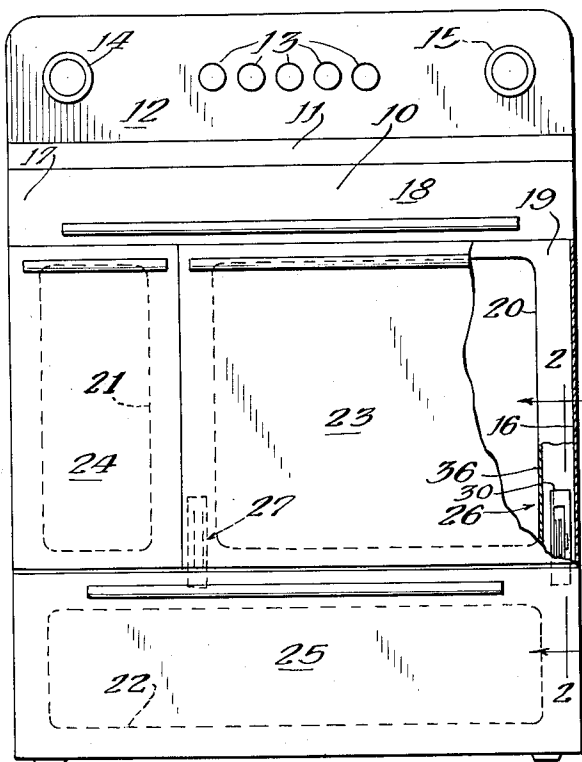


FIG. 1

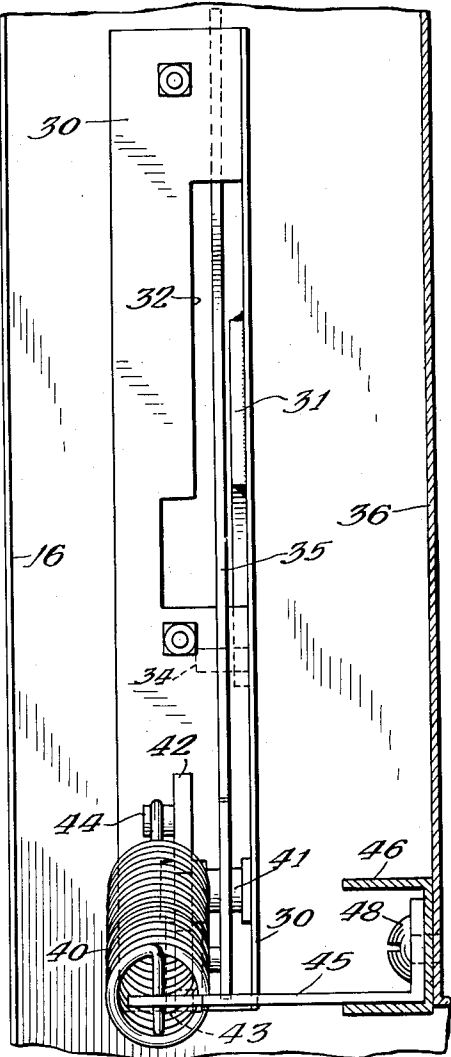


FIG. 3

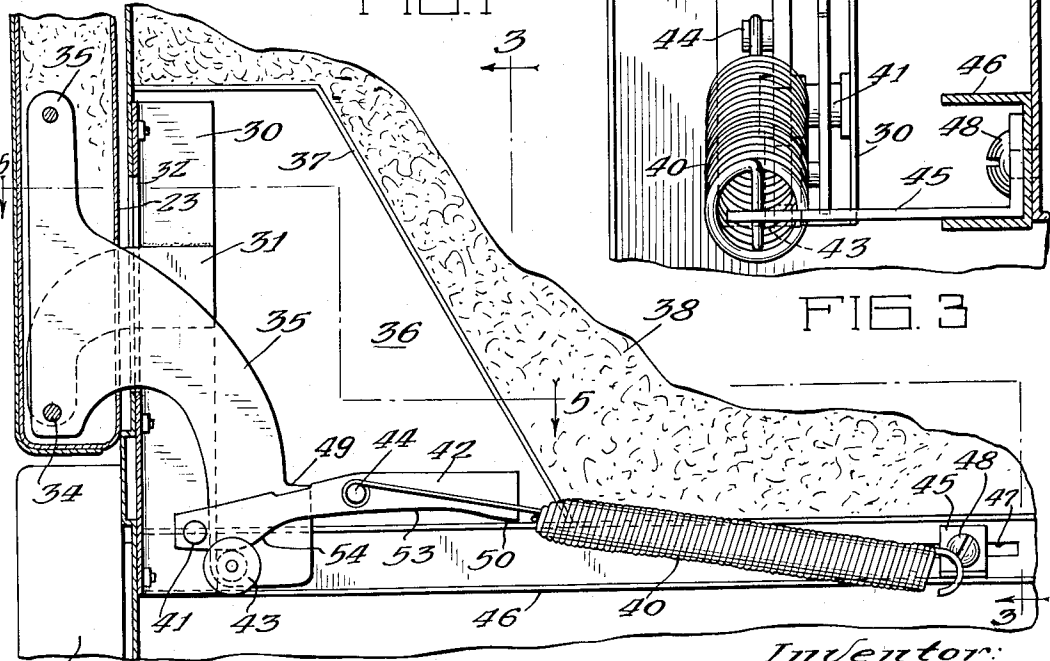


FIG. 2

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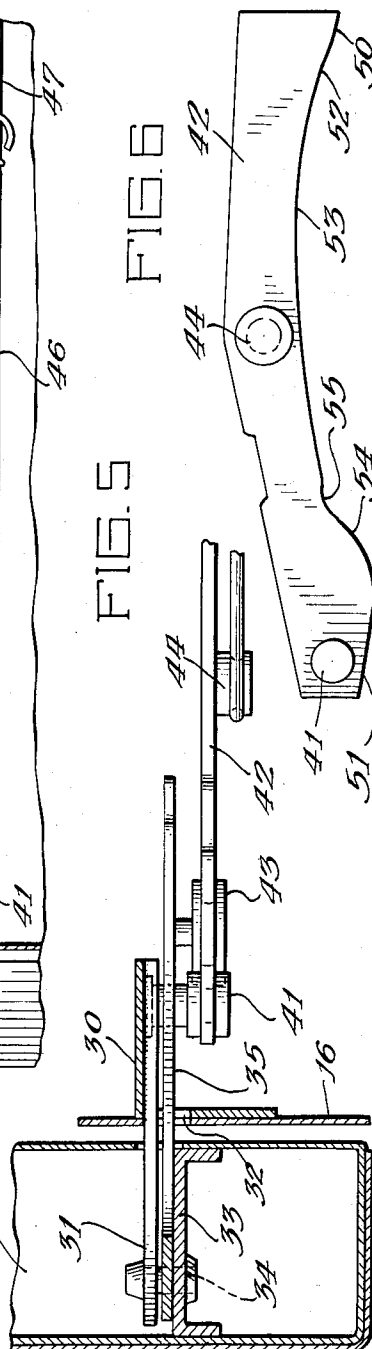
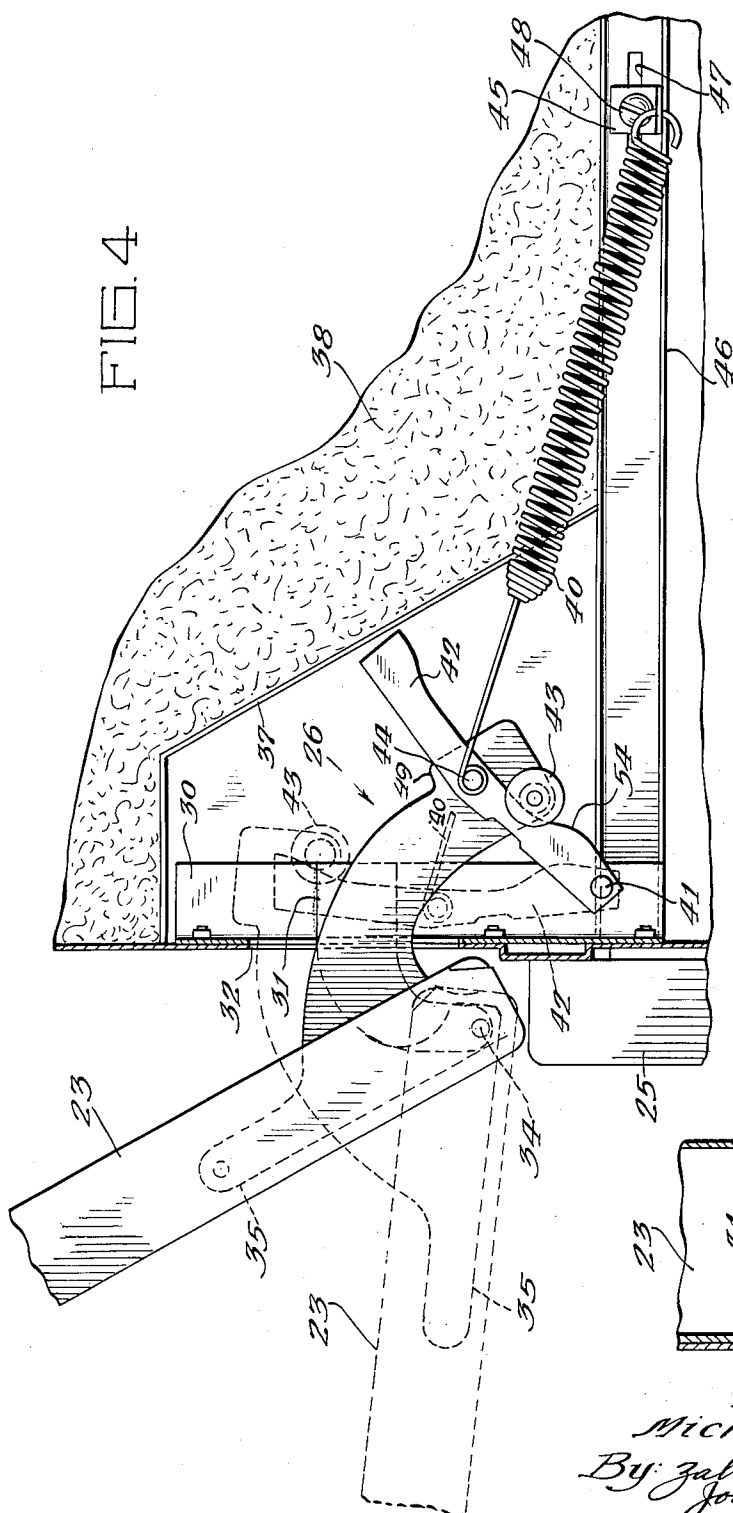
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## STOVE CONSTRUCTION

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5 Claims. (Cl. 126—191)

This invention relates to an improved stove construction and in particular, to an improved arrangement of oven door and storage drawer, and to an improved counterbalancing oven door hinge which will not interfere with the operation of the storage drawer.

Oven doors are customarily provided with a special spring hinge which biases the oven door into closed position. Heretofore, the spring has been arranged vertically so that it extends downwardly beyond the oven into the area customarily occupied by a storage drawer or a broiler drawer. This arrangement prevents the use of a drawer which is wider than the oven.

According to the present invention, I have provided a stove embodying an oven, and a storage drawer disposed beneath the oven which is wider than the oven and which preferably can extend for the full width of the stove.

It is a further object of my invention to provide an improved oven door hinge mechanism in which the spring and other parts of the hinge mechanism do not extend downwardly below the level of the oven.

It has been the practice in oven door mechanism to provide a door stake which is an element rigidly secured to the oven door and which extends rearwardly thereof into the body of the stove. Thus, the rear end of the oven stake moves in an arcuate path as the oven door is opened. Heretofore the counterbalancing spring has been secured directly to the door stake. Since the arcuate motion of the door stake is essentially a motion in a vertical direction, it has been necessary to dispose the spring vertically in order to obtain the desired counterbalancing or door closing action.

According to the present invention, I interpose a cam lever between the oven door stake and the spring which serves to convert the substantially vertical motion of the door stake into a horizontal motion. Thus, I am enabled to dispose the counterbalancing spring in a generally horizontal direction so that it will not extend beneath the oven and into the drawer space beneath the same.

Still another object of my invention is to provide an improved hinge mechanism in which the force applied by the spring varies in accordance with the angular position of the oven door.

An oven door, at the present time, is customarily hinged at its bottom. This means that the lever arm of the weight of the door, or moment, is greatest when the door is in open position; hence, the force required to counterbalance the door when it is in its horizontal open position is much greater than the force required when the door is only partially open.

This variation in the counterbalancing force is nonlinear. The usual spring mechanism heretofore employed has provided a substantially linear force with the result that in order to counterbalance the door in some positions it will be over-counterbalanced in other positions. The practical effect of such prior art constructions is that when the door is once released from its horizontal or fully open position, it will move with a constantly accelerated motion towards its closed position. This results in a slamming of the oven door which is undesirable for reason of noise, mechanical shock and safety to the operator. For instance, if the operator's hand is not

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completely clear of the oven at the time the door slams shut, it will receive a severe blow.

According to the present invention I have introduced between the door and the spring, a cam mechanism which can be so designed as to counterbalance the door in any given angular position of the door between its closed and fully open position, and which is designed so that there is a slight bias on the door when in its closed position, to hold it shut and in which there is a slight bias on the door in its fully open position to hold it open.

A further object of the present invention is to provide an improved hinge construction which permits the door to remain ajar or in a partially closed position. This feature is of special utility when the oven is also used for broiling, as in the case of an electric stove.

Other objects, features and advantages will become apparent as the description proceeds.

With reference now to the drawings in which like reference numerals designate like parts:

Fig. 1 is a front elevation of a stove embodying my invention;

Fig. 2 is a vertical section taken along line 2—2 of Fig. 1 showing the hinge mechanism in side elevation;

Fig. 3 is a rear elevation of the hinge mechanism taken along line 3—3 of Fig. 2;

Fig. 4 is a vertical section similar to Fig. 2, but showing in solid lines the door in a partially open position, and showing in broken lines the door in fully open position;

Fig. 5 is a plan view taken along line 5—5 of Fig. 2, and

Fig. 6 is an elevation of the cam.

With reference now to Fig. 1, the reference numeral 10 designates the body of an electric range which is provided with a stove top 11 and a back splash plate 12 on which are mounted the usual controls 13, a timer 14 and an oven vent 15.

The body is made up of various panels including a side panel 16 and front panel 17. The latter comprises an exposed portion 18 and a recessed portion 19 which is formed with three openings, an oven opening 20, a side storage opening 21 and a bottom storage opening 22. The recessed portion and the respective openings therein, are fully covered and concealed with an oven door 23, a side hinged storage door 24, and a bottom storage drawer 25.

The oven door is hingedly mounted at its bottom corners by hinge mechanisms 26 and 27 which are substantially identical to each other, so that only one will be described herein. These hinge mechanisms are so designed that they do not extend downwardly into the storage drawer 25. Thus, I am enabled to provide a bottom storage drawer 25 which extends substantially the full width of the stove.

With reference now to the remaining figures which illustrate the hinge mechanism, an angle iron 30 is suitably secured to the rear surface of the front panel 17. A hinge bracket 31 is welded or otherwise secured to the flange of the angle iron and extends forwardly through an opening 32 in the web of the angle iron and through a suitable opening in the rear surface of the oven door 23. The oven door 23, as shown in Figs. 2 and 5 is of a box-like construction of substantial thickness so that it may be filled with insulating material, not shown. As shown in Fig. 5, a channel member 33 is vertically disposed within the oven door and serves as a structural member to which is secured a pivot pin 34 on which the hinge bracket 31 is pivotally mounted. The pivot pin 34 thus provides an axis about which the door may swing open and closed, and it will be observed that the axis is set forwardly from the front panel 17 in such a manner that there will be no interference between the door 23 and the front panel 17 or the upper front surface of the storage drawer 25.

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A door stake 35 is suitably mounted on and secured to, as by welding, the channel 33, and includes a portion which extends rearwardly through the opening 32 into the space between the oven wall 36 and the side panel 16. As shown in Fig. 2, a barrier 37 is provided for the insulation 38, in order that the insulation may be kept away from the hinge mechanism 26. The details of the shape of the barrier are not fully shown, but it is understood that, where the nature of the insulation so requires, that the barrier may be shaped so as to provide a compartment which will accommodate all of the parts of the hinge mechanism, including the spring 40.

Projecting inwardly from the flange of angle iron 30 is a pivot 41 on which a cam lever 42 is pivotally mounted. The door stake 35 carries, at its lower end, a roller 43 which cooperates with and engages the lower surface of cam lever 42. The cam carries a stud 44 to which one end of the spring 40 is swivelly mounted. The other end of the spring may be hooked onto a lug 45 which is adjustably mounted on channel 46. As shown in Fig. 2, the channel may be provided with a slot 47 through which a screw 48 extends so that the position of the spring anchoring lug 45 may be adjusted in order to regulate the tension of the spring 40.

The door stake 35 is provided with a stop 49 which engages the web of angle iron 30 to determine the fully open position.

The drawings show three different positions of the parts which can be referred to as the first position (Fig. 2); the second position (solid lines Fig. 4) and the third position (dotted lines, Fig. 4).

In operation, the movement of the oven door 23 causes movement of the cam 42 in the same rotational direction.

Thus, there are two moments applied to the cam 42. The counterclockwise moment, or roller moment applied by the roller 43 is equal to the product of the force exerted by the door times the lever arm of the roller 43 with respect to pivot 41. The clockwise or spring moment, is equal to the product of the force exerted by the spring times the spring lever arm, which is the projection of the distance between points 44 and 41.

When the parts are in the Fig. 1 position, and during the initial movement of the door, the roller moment is comparatively small. However, by arranging the cam 42 and the spring 40 horizontally, the spring lever arm is also very small to the end that the two moments tend to balance each other.

However, as the parts move from the solid to the dotted line positions of Fig. 4, the force of the spring is applied more directly to the cam lever, with the result that substantially the full force of the spring is available for counterbalancing the door as it moves into its fully opened position.

Thus, a mechanism is provided in which a rough degree of counterbalance is inherently provided.

Further refinement of the counterbalancing action may be obtained by shaping the surface 50 of cam lever 42 so as to modify the forces involved.

For instance, referring to Fig. 6, the shape of the cam surface in the region 51 is such that the clockwise moment is greater than the counterclockwise moment so that the door 23 will be biased shut. In the region 52, the slope is increased so that the counterclockwise moment is greater than the clockwise moment, so that the door will remain fully open.

Due to manufacturing tolerances, there is up to plus or minus 6% variation of tension in commercial springs; hence, it is not possible to achieve exact counterbalancing at all intermediate positions. It is therefore preferable to overcompensate in the region 53 of the cam surface, so that the door will be biased shut between the second and third positions, which results in a relatively pronounced slope in the uncompensated region 54. Thus, in the case of a minimum tension spring, the momentum

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of the closing door will carry it through the second to first position range.

In order to maintain the door slightly ajar for broiling, where the range embodies a broiler unit in the upper part of the oven, the cam surface is so shaped as to provide a detent 55 in the region 54 so that the oven door may be counterbalanced in this broiling position irrespective of variations in the tension of spring 40.

I claim:

1. Hinge mechanism for an oven door comprising said oven door, a pivot therefor, a door stake secured to the oven door and movable therewith, a roller carried on said door stake at a point spaced radially from said pivot of said oven door, a pivotally mounted cam, a pivot for said cam disposed adjacent said roller when said door is in closed position and being located between said roller and said door pivot so that said roller engages said cam to rotate said cam in the same direction as the rotation of said door, said roller moving outwardly and away from said cam pivot as said door moves toward its open position, and a spring engaging said cam and biasing it toward door closed position, whereby the counterbalancing force applied by the spring to said door is modified by the angular disposition of said cam.

2. Hinge mechanism for an oven door comprising said oven door, a pivot therefor, a roller carried by said oven door and movable therewith in an arcuate path around said pivot of said oven door, a pivotally mounted normally horizontal cam, a pivot for said cam disposed between said door pivot and said roller when said roller is in door closed position so that said roller engages said cam to move said cam upwardly in the same rotational direction as the movement of said door, said roller moving outwardly and away from said cam pivot as said door moves toward its open position, and a horizontally disposed spring engaging said cam and biasing it toward door closed position, whereby the counterbalancing force applied by the spring to said door is modified by the shape of said cam surface.

3. A range including wall means providing an oven, a downwardly opening oven door, a pivoted cam lever extending rearwardly away from said door when said door is in normal closed position, a rearwardly extending spring engaging said cam lever and being, in normal position, in substantial horizontal alignment with said cam lever and being located substantially level with the bottom of said oven, a pivot for said cam, and a cam follower carried by said oven door and projecting rearwardly therefrom and engaging the under surface of said cam lever at a point rearwardly of said pivot when said lever is in normal position so that movement of said oven door from closed to open position will cause said cam follower to move upwardly and said cam lever to move upwardly and forwardly thereby causing said spring to be tensioned in an amount corresponding substantially to the forward component of the rotational motion of said cam about its pivot.

4. A range as claimed in claim 3 in which the under surface of said cam is provided with a detent corresponding to a partially opened oven door position.

5. A range as claimed in claim 3 in which the slope of the remote end portion of said cam surface is increased so that the moment exerted on said cam surface by said cam follower will exceed the moment exerted thereon by said spring when said door is in fully opened position.

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